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EP 0389735 A1

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(54) Waste collecting machine with refund mechanism

(57) The machine comprises a housing 1 having two entrances 12, 11 for waste metal cans and glass bottles respectively, a mechanical arm 2 to collect and deliver waste metal cans or glass bottles into said entrances respectively, a roller ramming mechanism 3 to crush waste metal cans, a metal detector to detect metal cans, an electromagnet 43 controlled by said metal detector to shift a sub-slide way to the left or right according to detection result, a counting device 44 to count the number of waste cans or glass bottles passing thereby, and a refund device 45 to give coins/notes/tokens in return for the waste cans or bottles received.

Details of the various parts of the machine are given. For example, the transmission of arm 2 (see Figure 7) includes a shaft and a chain wheel. The roller ramming mechanism 3 comprises a motor 33 to drive four pairs of rollers 34 the lowest pair of which are adjustable by means of an adjusting screw 38 to control the position of a slide block (36, Figure 5).

Indicator lamps 161-163 give functional indication.

A drain port 18 is provided.

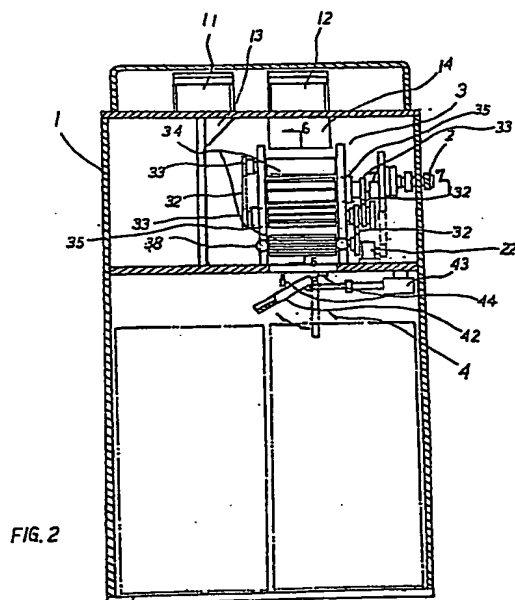


FIG. 2

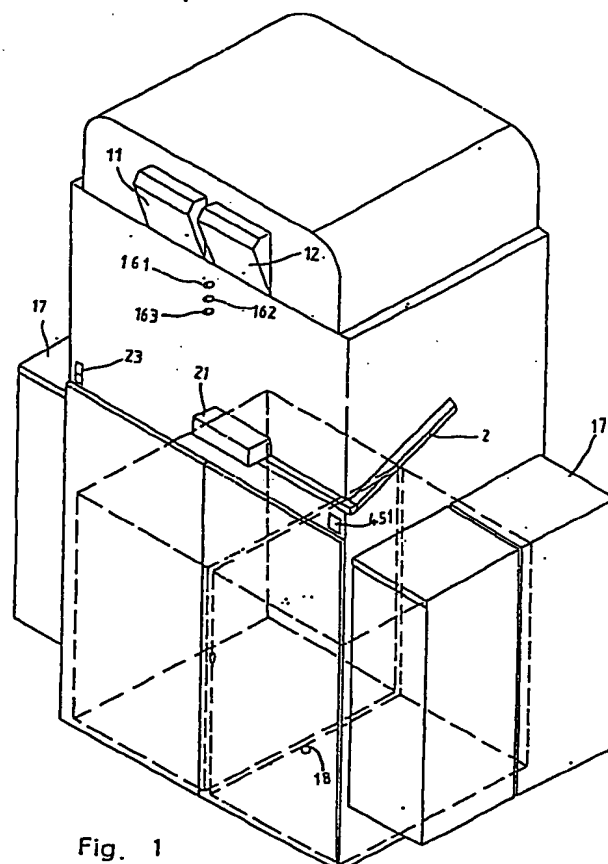


Fig. 1

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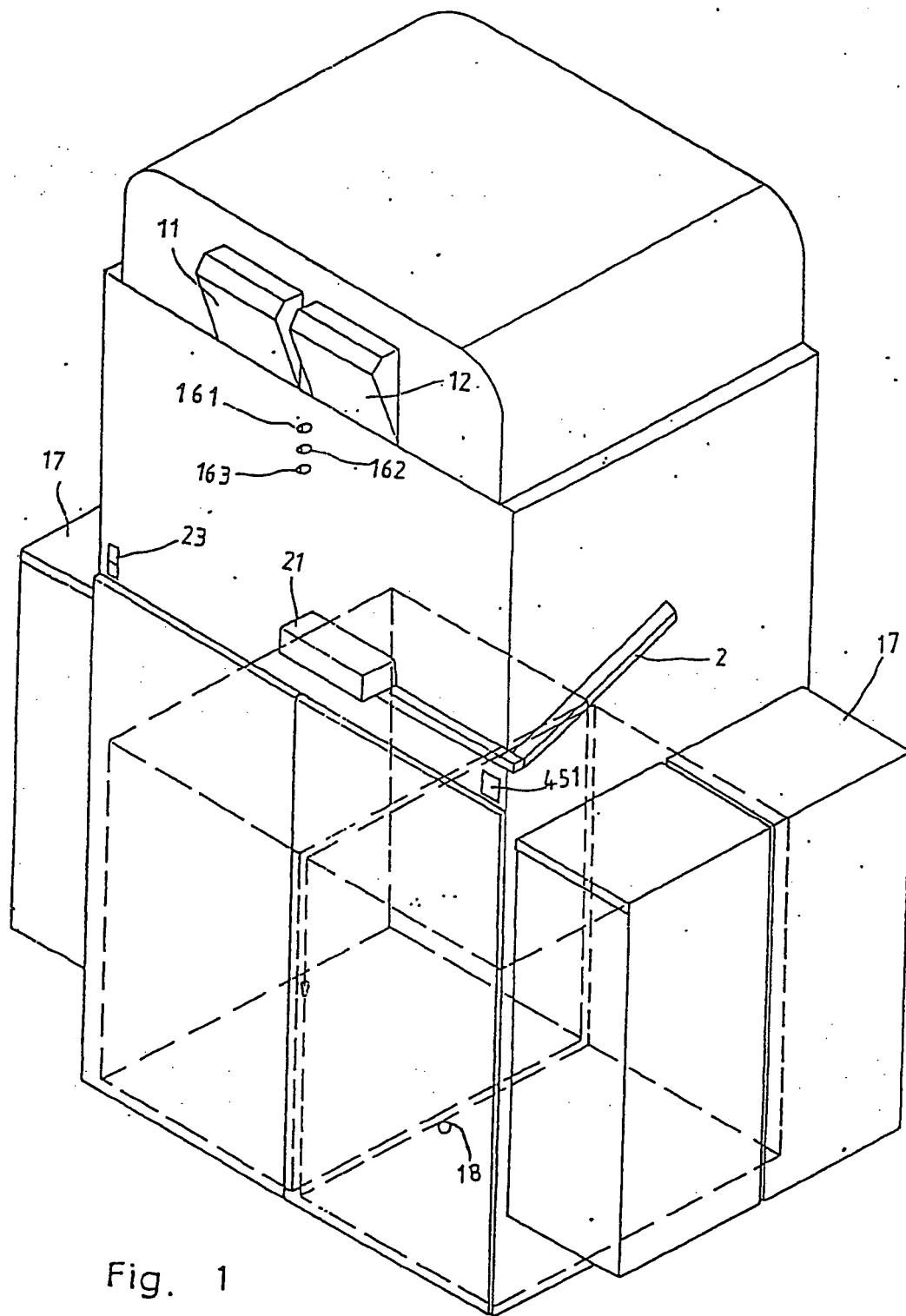


Fig. 1

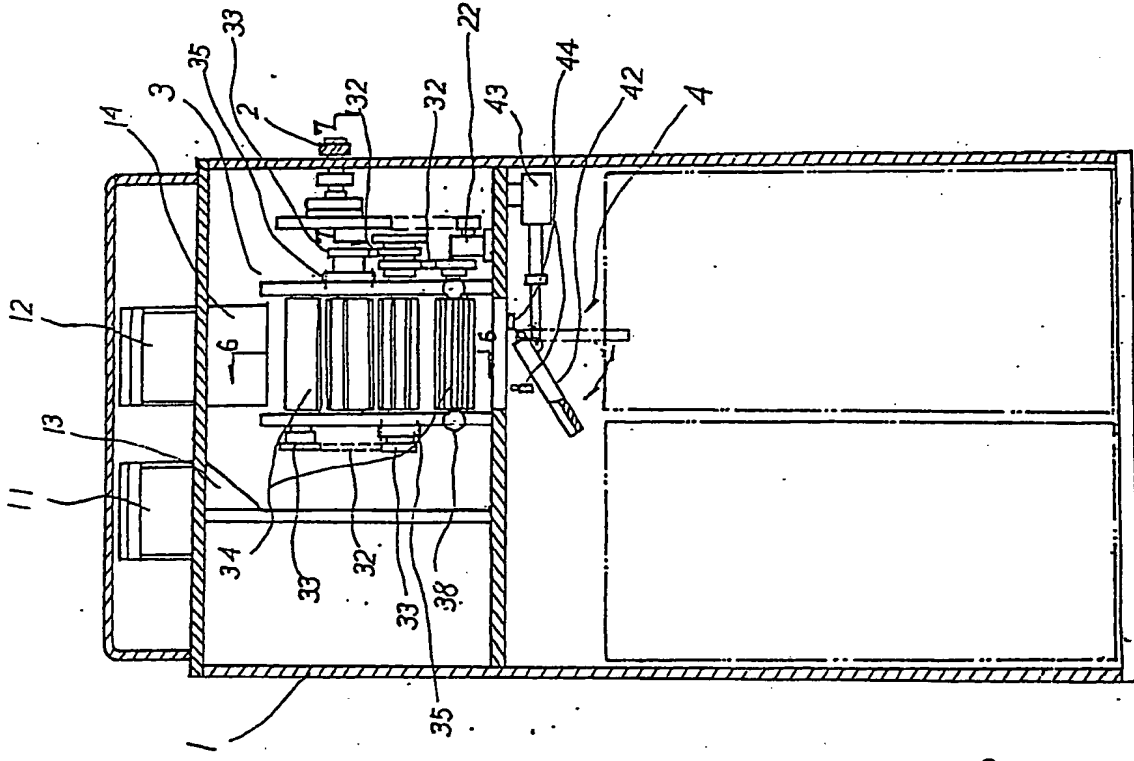


FIG. 2

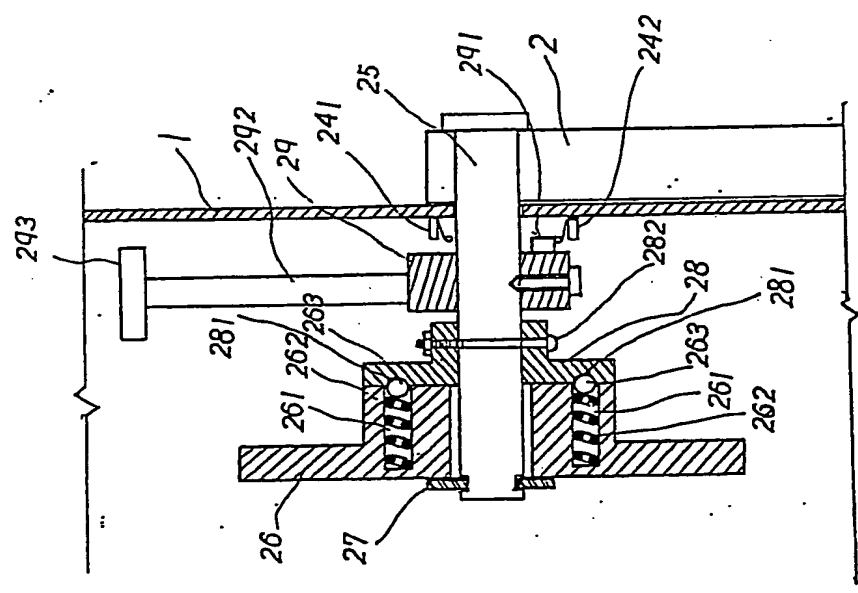
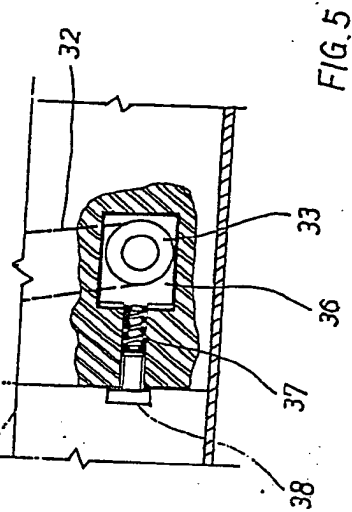
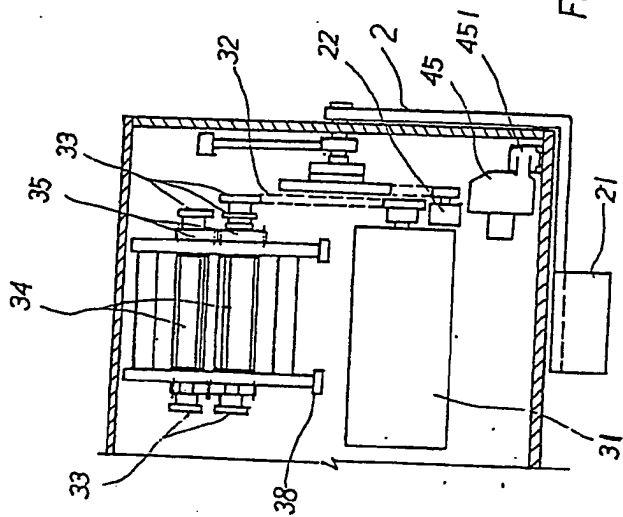
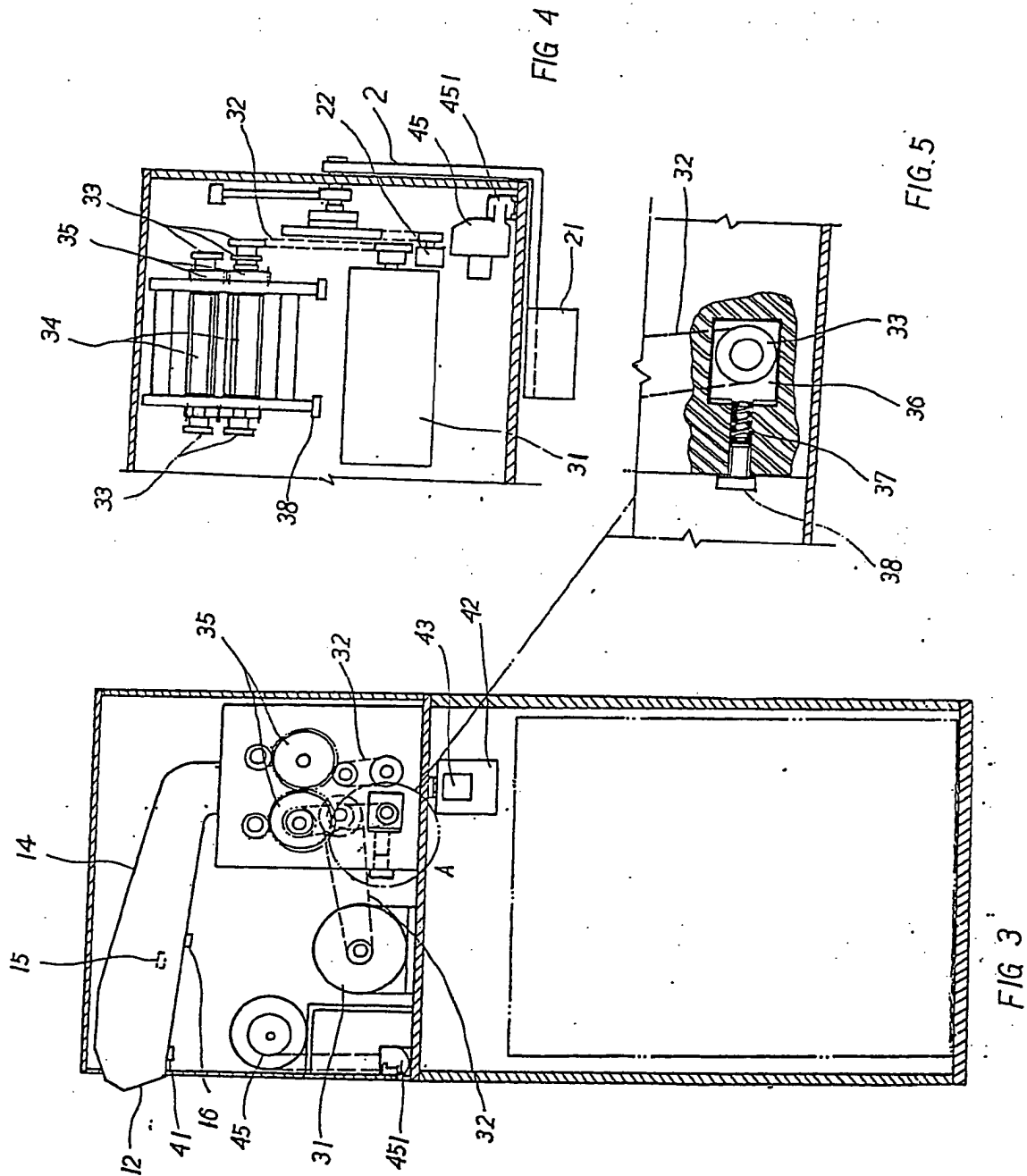


FIG. 7

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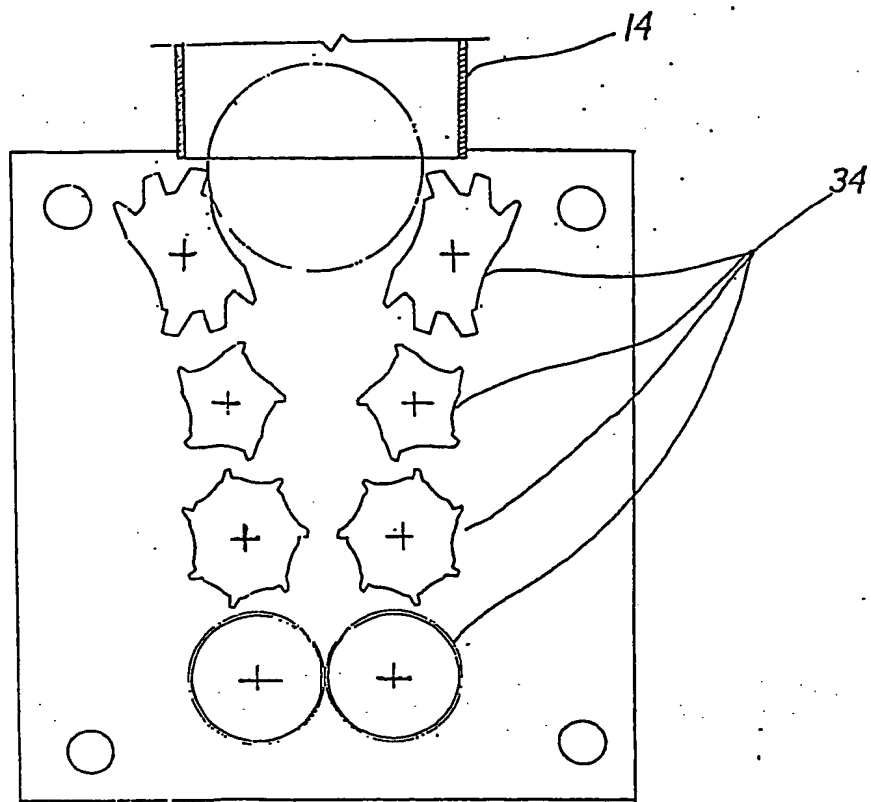


FIG. 6

A WASTE COLLECTING MACHINE WITH COIN REFUND MECHANISM

5 The present invention relates to a waste collecting machine
and more particularly to a waste collecting machine for
collecting waste bottles and cans which has a roller ramming
mechanism incorporated therein to ram collected waste bottles
or cans into flat shape and a coin refund mechanism to auto-
10 matically pay coins for the waste bottles or cans put
therein.

In conventional waste reclamation operation, waste materials
are classified by labor and respectively collected in
15 separate containers for further treatment. Because material
classification is made by labor, it requires much time to
perform and error classification problem is difficult to
eliminate. Because the containers for collecting waste
materials and the waste materials to be classified are
20 generally placed at different locations slightly far from one
another, workers who classify waste materials and dispense
classified waste materials into respective containers may
carelessly put waste materials in wrong containers. Further,
after classification, waste bottles and cans generally occupy
25 much space for collection.

SUMMARY OF THE INVENTION

The present invention has been accomplished under the
30 circumstances in view. It is therefore an object of the

present invention to provide a waste collecting machine which has means to automatically classify metal and non-metal bottles and cans.

- 5 It is another object of the present invention to provide a waste collecting machine which has means to crush collected waste metal containers into flat shape so as to reduce space occupation.
- 10 It is still another object of the present invention to provide a waste collecting machine which has means to count the quantity of waste container put therein, and means to pay coins for the waste containers collected.

15 BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be described by way of example with reference to the annexed drawings, in which:

- 20 Fig. 1 is a three-dimensional perspective of a preferred embodiment of the present invention;

Fig. 2 is a front elevational view of the present invention showing the manner in which elements of the invention is
25 positioned;

Fig. 3 is a left side elevational view of the present invention showing the manner in which elements of the invention is positioned;

Fig. 4 is a top plan view of the present invention showing the manner in which elements of the invention is positioned;

Fig. 5 is an enlarged, fragmentary side elevational view taken on part A in Fig. 3;

Fig. 6 is an enlarged, fragmentary, sectional, side elevational view taken on line 6-6 in Fig. 2; and

Fig. 7 is an enlarged, fragmental, sectional, front elevational view taken on line 7-7 in Fig. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to annexed drawings in greater detail, the preferred embodiment of the waste collecting machine of the present invention is generally comprised of a housing 1, a mechanical arm 2, a roller ramming mechanism 3, and a waste material classifier 4.

20

The housing 1 has a first entrance 11 for waste glass bottles, a second entrance 12 for waste non-glass cans, a first slide way 13 connected to said first entrance 11, a second slide way 14 connected to said second entrance 12, a photo-sensor 15 set in said second slide way 14 at one side, a second metal detector 16 set deeper inside the second slide way 14, red, yellow, and green indicator lamps 161, 162, and 163 at the front for functional indication, a plurality of dustbins 17 connected thereto at the outside, and a drain port 18 at the bottom.

30

The mechanical arm 2 has a box 21 attached thereto at the front end thereof and is driven by a motor 22 to move in a predetermined course by means of the control of a start switch 23. Two micro-switches 241 and 242 are respectively
5 made on the housing 1 at two opposite locations to confine the upper and lower limits of the moving range of the mechanical arm 2. The mechanical arm 2 is provided to help young children to send waste bottles or cans into the entrance 12 by means of the box 21 thereof.

10

Please refer to Fig. 7 for more detailed description of a transmission mechanism of the mechanical arm 2. A main shaft 25 to which the mechanical arm 2 is connected has a chain wheel 26 set to its other end opposite to the arm 2. On inner
15 surface of the chain wheel 26, holes 261 are axially formed to just accommodate a spring 262 and a steel ball 263 in each of the hole 261. A C-clamp 27 is used to fixedly position the chain wheel 26 on the main shaft 25. A fixed piece 28 having cavities 281 separately corresponding to the holes 261
20 are fixed to the main shaft 25 with a set pin 282 by screwing the set pin 282 into and through the main shaft 25. The steel balls 263 each half extends into the free end of the hole 261 and half extends into the cavity 281 to link the fixed piece 28 and the chain wheel 26 to move together and thereby causes
25 the main shaft 25 to drive the mechanical arm 2 to rotate. When the load carried by the mechanical arm 2 is too heavy to permit the chain wheel 26 to drive the fixed piece 28, the chain wheel 26 will run idle. A cam 29 with a projected block 291 is further provided on the main shaft 25 in such a
30 manner that the projected block 291 can just touch the two

micro-switches 241, 242 and thereby limits the vertical travel of the mechanical arm 2. A long stem 292 having a steel block 293 at its outer end is provided on the cam 29, extending in a direction opposite to the mechanical arm 2 so
5 that it can be used to balance the mechanical arm 2.

The roller ramming mechanism 3 comprises a motor 33 to drive a plurality of chains 32 to carry a plurality of chain wheels 33 to rotate, so as to further drive four pairs of rollers 34
10 to relatively rotate in reverse direction by means of the operation of a plurality of spur gears 35. The four pairs of rollers 34 are respectively arranged in two lines. When the four rollers at the first line are driven to rotate in clockwise direction, the four rollers at the second line are
15 driven to rotate in counter-clockwise direction. Therefore, waste containers delivered to the roller ramming mechanism 3 between the two lines of rollers will be immediately crushed into flat shape. Further, there is provided an adjusting screw 38 coupled with a spring 37 to control the position of
20 a slide block 36 which is attached to the lowest pair of rollers 34 at one side for regulating the gap between the rollers 34.

The waste material classifier 4 comprises a first metal
25 detector 41 set in the second slide way 14 at the bottom for detecting waste metal material, a sub-slide way 42 disposed at the bottom of the roller ramming mechanism 3, a micro-switch 44 set in said sub-slide way 42 at the top for counting control, an electromagnet 43 set in said sub-slide way at one
30 side, and a coin refund control device 45 set inside the housing 1 at the middle.

When non-glass type of waste cans are inserted through the second entrance 12 into the second slide way 14 toward the rollers 34, the photo-sensor 15 is triggered to drive the reducer motor 31 to carry the rollers 34 to rotate so as to
5 crush waste cans into flat shape. After having been squeezed out of shape, crushed waste cans drop into the sub-slide way 42. When there is any waste bottle or can dropping into the sub-slide way 42, the first metal detector 41 is simultaneously triggered to make a judgement so as to drive the
10 magnet 43 to attract the sub-slide way 42 to the left, when detected waste bottle or can is a metal object, permitting the waste bottle or can to fall into the receiving chamber at the left side. If the waste bottle or can is a non-metal object, the sub-slide way 42 remains immovable so that the
15 waste bottle or can is guided to drop into a receiving chamber at the right side. The micro-switch 44 in the sub-slide way 42 is simultaneously triggered to count the number of cans or bottles passing therethrough so as to further drive the coin refund control device 45 to give out coins
20 according to the quantity of cans or bottles counted.

The slide block 36, spring 37, and adjusting screw 38 are incorporated together for regulating the gap between the two lines of rollers 34. There is also provided an overload
25 protection device to automatically cut off power supply to the reducer motor 31 so as to protect the reducer motor 31 from damage due to overload. Under overload protection mode, the red indicator lamp 161 is turned on for indication (yellow indicator lamp 162 indicates that the machine is
30 under operation, and green indicator lamp 163 indicates that

the machine is normal). During the operation of the roller ramming mechanism 3, waste water from waste cans or bottles is guided to drain out of the machine through the drain port 18. Dustbins 17 are provided for collecting special waste objects or for use in an emergency when the receiving chambers inside the machine are fully occupied.

As shown in Fig. 3, the second metal detector 16 in the slide way 14 is used to check the object put into the entrance 12 for the standard volume or diameter. When the volume or diameter of the detected object reaches a predetermined standard, the first and the second metal detectors 41, 16 are triggered to serially work together and to count in advance. On the other hand, when any object dropped into the second entrance 12 is detected to be a metal can not big enough to meet the predetermined standard or a non-metal object at all, it would not trigger the two metal detectors 41, 16 to count. The dropped object is then moves toward the roller ramming mechanism 3 and is crushed and squeezed therein as described in the above. When the squeezed metal object passes the sub-slide way 42, the first metal detector 41 is triggered again to detect and confirm a metal object so that micro-switch 44 is triggered to count. The collection of waste metal cans or bottles shall be deemed complete at this stage and any refund is only possible at this point, too. That is, any wrong refund is avoided by double detecting and confirming a squeezed metal object through the two metal detectors.

Please further refer to Fig. 6 in which the shape of the four pairs of rollers 34 is shown. The four pairs of rollers 34 are arranged from top to bottom in two symmetrical lines. Each lower pair of rollers 34 have higher numbers of teeth than that pair of rollers 34 above them so that the metal objects passing them can be thoroughly crushed to flat shape.

What is claimed is:

1. A waste collecting machine, comprising:

5 a housing having at the top on the front panel thereof a
first entrance for waste bottles and a second entrance
for waste metal cans, a first slide way connected to
said first entrance, a second slide way connected to
10 said second entrance, a photo-sensor set in said second
slide way at one side for detection of any metal can
passing thereby, a red indicator lamp for damage
indication, a yellow indicator lamp for indication of
under operation, a green indicator lamp for indication
15 of normal function indication, a plurality of dustbins
connected thereto at the outside, and a drain port at
the bottom for discharging waste water;

20 a mechanical arm having a box at the front end thereof and
driven by a motor to move in a predetermined course by
means of the control of a control switch, and confined
by two micro-switches to move within an upper and a
lower limit for sending waste bottles or cans into said
first or second entrance;

25 a roller ramming mechanism comprising a reducer motor to
drive a plurality of chains to carry a plurality of
chain wheels to rotate so as to further drive two
opposed sets of rollers to relatively rotate in reverse
direction for squeezeing waste metal cans out of shape,
30 by means of the operation of a plurality of spur gears

respectively mounted one each set of rollers and engaged with one another, a pitch regulating device comprising an adjusting screw coupled with a spring and a slide block attached to said rollers for regulating the gap between the two opposed sets of rollers;

a waste material classifier comprising a first metal detector set in said second slide way at the bottom for detecting waste metal cans passing thereby, a sub-slide way disposed at the bottom of said roller ramming mechanism, a micro-switch set in said sub-slide way at the top for counting control, an electromagnet set in said sub-slide way at one side, and a coin refund control device set inside said housing at the middle; and

wherein said metal detector drives said electromagnet to drive said sub-slide way to the left upon detection of waste metal can passing thereby, when waste metal can is detected passing thereby so as to let waste metal can to drop into a receiving chamber at the left side inside said housing; said electromagnet does not work when no metal object is detected, so that said sub-slide way remains immovable permitting non-metal, waste can or bottle to drop into a receiving chamber at the right side inside said housing; the micro-switch in said sub-slide way is provided to count the number of waste cans or bottles passing thereby so as to trigger said coin refund control device to give coins in return for the waste cans or bottles received.

2. A waste collecting machine as claimed in claim 1, wherein
a second metal detector is set in said non-glass slide way
at a deeper position thereof to detect and check objects
dropped into said non-glass slide way for a volume or
5 diameter reaching a predetermined standard; said second
metal detector and said first metal detector being
serially work together to avoid any wrong refund.

3. A waste collecting machine as claimed in claim 1, wherein
10 said mechanical arm has a transmission mechanism which
comprises of a main shaft to which said mechanical arm is
connected at one outer end, a chain wheel provided at
another end of said main shaft opposite to said mechanical
arm and having a plurality of axially extended holes
15 formed on its inner side surface for accommodating a
spring and a steel ball in each of said holes, and a fixed
piece having a plurality of cavities formed on a side
facing said chain wheel at positions corresponding to said
holes on said chain wheel and being fixedly mounted to
20 said main shaft with a set pin being screwed into and
through said main shaft; said steel balls each half
extending into said hole on said chain wheel and half
extending into said cavity on said fixed piece, causing
said chain wheel to drive said fixed piece, main shaft,
25 and thereby said mechanical arm to rotate when said chain
wheel is driven by said motor thereof.

4. A waste collecting machine as claimed in claim 3, wherein
said cam on said main shaft for actuating said two micro-
30 switches controlling travel of said mechanical arm has a

long stem extending in a direction opposite to that of said mechanical arm and has a steel block provided at its free end to balance said mechanical arm.

5. A waste collecting machine as claimed in claim 1 in which the refund control device refunds notes, tokens or other form of credit.
6. A waste collecting machine substantially as herein described with reference to and as illustrated in the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number

9201560.1

Relevant Technical fields

(i) UK Cl (Edition K) B2A

(ii) Int Cl (Edition 5) G07F

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI

Search Examiner

J M WORVELL

Date of Search

20 FEBRUARY 1992

Documents considered relevant following a search in respect of claims

1-6

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	EP 0389735 A1 GOVONI	1



Category	Identity of document and relevant passages	Relevant to claim(s)

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